PURULENT MYELITIS.—FOCAL AND DISSEMINATED.[1]

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of New York.

Abscess of the spinal-cord being a most uncommon disease (there are 17 or more cases on record) the clinical picture which it produces is not very well known. Because of the nature, extent and complications of the disease, the symptoms which it causes are liable to the greatest variation. For instance, in the case reported herewith, the diagnosis of syphilitic spinal paralysis had been made, and naturally when the paraplegia was not yet complete such diagnosis was quite as tenable as any other. Moreover, in this case there was apparently no attributable cause or starting point for the abscess formation, save possibly an attack of influenza, and although I considered the case one of abscess or gumma of the cord which had undergone disintegration, this diagnosis was reached only by exclusion. Although in four of the seventeen cases that are to be found in the literature, there seems to have been a primary infection of the spinal cord, in all of the other cases the abscess was evidently the result of trauma (five cases), of metastasis (seven cases), bronchiectasis, gonorrhea, and suppurative prostatitis.

The onset and course of the disease, its clinical manifestations and the findings of the autopsy in this case are therefore of very considerable interest.

The patient, an unmarried Frenchwoman, twenty-five years old, was admitted to the City Hospital, February 20, 1902.

The history of her illness seemed to be as follows:

Two years ago, while still in France, she fell from a step-ladder striking the front of her body, legs and head. There were no injuries from this fall so far as she knows. Two months later she came to this country and went to work as a chambermaid. In the beginning of the year 1901, i.e., ten months before her entrance to the City Hospital, she says she had the grippe for a week, and it is from this time that she dates her illness. She soon began to complain of a sensation of coldness and pain in the left lower extremity and in the small of the back. A month or so later she remarked that the left lower extremity was becoming weak. She continued work until about Easter, when she felt obliged to stop.

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[1] Read by title American Neurological Association.

Until June 1, 1901, or thereabouts, when she was admitted to the French Hospital, she was able to walk with the aid of a stick or umbrella. Her condition was thought to be syphilitic disease of the cord, and she was given vigorous antisyphilitic treatment, inunctions, hypodermic injections of bichloride of mercury, and potassium iodide in increasing doses up to 120 grains 3 times a day. She continued to grow worse, however, i.e., to develop more profound enfeeblement of the lower extremities and to complain of pain, especially in the front of the left thigh and groin and occasionally in the abdomen, and in February, 1902, she was sent to Bellevue Hospital.

About a month before this time (January 1, 1902) she dates the involvement of the right lower extremity. Her most troublesome complaints at this time were (1) that the right leg felt cold, (2) the knees had a burning sensation, (3) the legs were stiff, not weak, and (4) there was a constant sensation of distressing burning pain in the lower part of the abdomen.

She was able to walk about fairly well until December, 1901, when, as she says, the right leg became paralyzed. She complained when she entered the City Hospital (February 20, 1902) of pain in the right thigh, constipation, some pain before and after micturition, and occasionally of some difficulty in starting the flow of urine.

A transcript of the examination made on February 21 is as follows: A finely built, handsome young brunette of intelligent expression, apparently well nourished although somewhat anemic.

She walks haltingly, with the aid of sticks, the right leg is very weak and uncertain. There is no muscular atrophy of either lower extremity. Both knee-jerks are exaggerated, and there is well-marked patellar and ankle clonus. A Babinski reflex is elicitable in both feet.

Sensibility: Left Lower Extremity—On the anterior surface of the thigh superficial sensibility is impaired; deep sensibility is intact. On the outer side sensibility to touch and temperature is lost. There is general hypoesthesia of the left leg. On the inner side of the leg tactile sensibility is lost, but temperature sensibility is preserved. On the posterior surface there is less disturbance of sensibility than on the anterior .

Right lower extremity: She mistakes superficial irritations, thinking the left leg is touched. On the inner and outer surfaces of the thigh all sensitiveness is lost. The anterior surface is somewhat sensitive. Anterior surface of right foot is sensitive to touch but not to temperature.

There is an area of hyperesthesia at the level of the 11th rib on the right side, and the abdomen is hypersensitive to touch and temperature.

Examination of the viscera reveals no abnormality.

The upper extremities and the cranial nerves are unimpaired.

A blood count shows hemoglobin 75 per cent; red blood cells 5,354,000; white blood cells 9,000. There are symmetrical scars over the shins, likewise a peculiar greenish brown discoloration in spots which appear typically syphilitic.

Examination April 14, 1902: The patient is now completely paraplegic. She can scarcely make any voluntary movement whatsoever of the lower extremities. The left lower extremity is spastic and resistant. The left leg seems an inch shorter than the right. This is due to the spasticity. Both plantar reflexes are absent; on the left side there is slight contraction of the tensor vaginæ femoris when the sole of the foot is irritated, but there is no movement of the toes.

The knee-jerks are elicitable on both side; the left is livelier than the right. The ankle-jerk can be elicited, the left being livelier, but there is no real clonus.

There is anesthesia, thermoanesthesia and some analgesia from the crests of the ilia and a line drawn around them, downward, in both extremities. The anesthesia is not absolute. It is most profound in the anoperineal region.

Just above this line is a belt of hyperesthesia two inches wide. Above the line of analgesia there is a thin line of thermoanesthesia on both sides.

The fine line of hyperesthesia exists only on left side. Excepting the left half of vulva and perineum which has escaped sensory disturbance, the remainder is anesthetic to all forms of stimulation. The right quadriceps extensor does not respond to the faradic current. All the other muscles do. There are no bedsores.

May 15, 1902.—There is no sphincter disturbance, but she had to be catherized yesterday, because attempts to pass water caused her so much pain. The patient assumes no pathognomonic attitude. The left foot is warm, the right cold. This difference in temperature is apparent in the entire extremity.

There is no voluntary movement of the lower extremities. The abdominal muscles seem to act vigorously and with slight assistance she assumes the sitting posture. There is some spasm of the back muscles which interferes with mobility. The plantar reflexes are absent. The ankle-jerks present, there being a slight clonic response which exhausts quickly. The knee-jerks are present, the left being stronger than the right, but not much exaggerated. There is no cross jerk. The abdominal reflexes are absent. The left gluteal reflex is slow, the right lively. The interscapular reflexes are lively, likewise the anal reflex.

The spine is tender, especially the 10th dorsal vertebra. Deep sensibility is impaired more in the left lower extremity than the right. She cannot tell when the left thigh is flexed or extended, but she has some idea concerning the right.

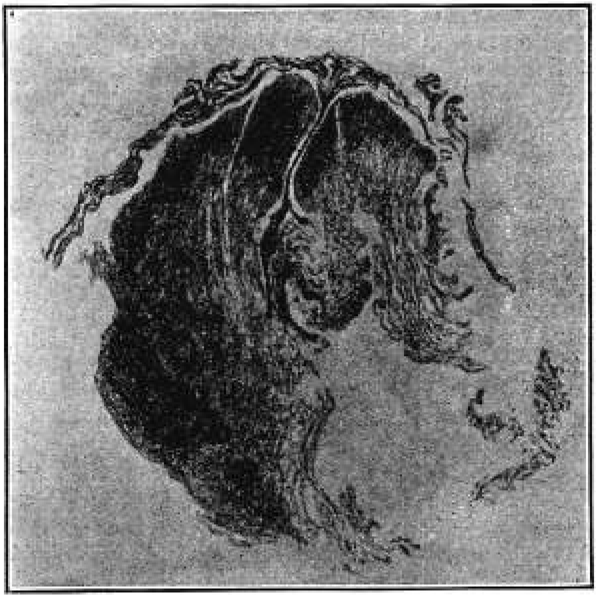

Fig. 1—Focus of disintegration in the sacral cord. Almost complete destruction of the gray matter.

Circumference of left thigh 36 cm.; circumference of right thigh 37 cm.; circumference left middle thigh 76 cm.; circumference right middle thigh 77 cm.

The patient died June 24. For a week or two preceding death there were fever, increasing weakness of the upper extremities and coma.

Summary and Recapitulation.—An unmarried woman, twenty-five years old, had an attack of influenza in January, 1901, shortly after she complained of paresthesia and pain in the left leg and back. Three months later she had to stop work because of weakness of the left leg. Pain and weakness continued to grow worse, and in January, 1902, the right lower extremity became involved. The right leg felt cold, there was a burning sensation in the knees, the legs felt stiff, and there was a constant sensation of burning in the lower part of the abdomen. Examination, February, 1902, showed exaggeration of the knee and ankle-jerks, patellar and ankle-clonus and Babinski jerk. Anesthesia on the anterior surface of the left thigh. Anesthesia and thermo-anesthesia on the outer side of the same area. On the posterior surface there was less disturbance of sensibility than on the anterior. On the inner and outer surfaces of the right thigh complete loss of sensibility. On the anterior surface of the right thigh there was still some sensitiveness. Two months later complete paraplegia, the left leg being spastic, the right flaccid. Loss of both plantar-jerks, knee- and ankle-jerks present, left greater than right. Anesthesia, thermo-anesthesia and some analgesia of both lower extremities from the crests of the ilia and a line drawn around them downward. Just above this line there is a belt of hyperesthesia two inches wide. Tenderness of spine at 10th dorsal vertebra. Striking vasomotor changes in the left foot. Death June 25, 1902.

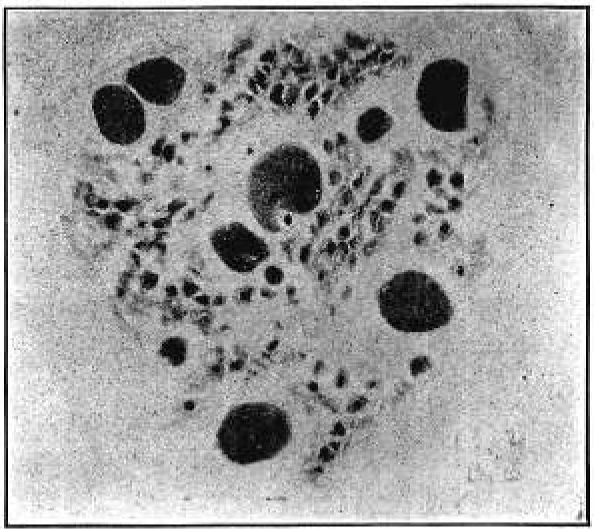

Fig. 2—To show absence of nerve fibers in the sacral focus.

Description of the general autopsy is omitted. No evidences of syphilis were found. The viscera or other structures of the body revealed no focus from which the abscess of the cord took its origin. When the spinal canal was opened the entire lower end was flooded with thin creamy pus. No abscess cavity was then detected. The sacrum seemed very soft, and it was removed and prepared carefully for the examination which revealed that it was not diseased..

When the cord was removed it presented from the lower dorsal region downward a thick, pulpy soft mass which at first gave the impression that it had been bruised post-mortem. The dura over this region was greatly thickened and adherent to the cord. In the sacral region a longitudinally placed cavity was to be seen. This first appeared like an extra-spinal cystic bag, but closer inspection and microscopic examination showed it to be an intramedullary cavity situated chiefly in the posterior portion of the gray and partly also in the white matter. It reached from the lower end of the cord about one inch upward. Downward it drained directly into the interstices between the root-bundles of the cauda equina, which interstices were filled with pus.

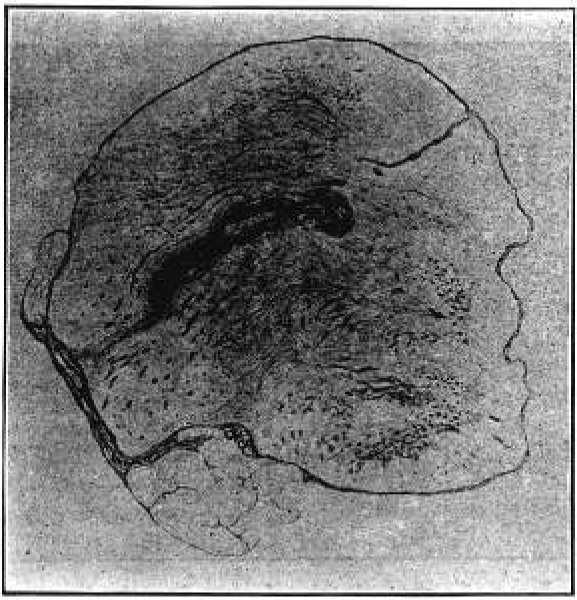

Fig. 3—Showing foci of purulent disintegration in the left anterior horn of a lumbar segment.

Microscopical examination.—(1) Cauda equina: Sections through the cauda equina show most of the septa between the nerve bundles thickened and beset with round cells. The masses between the roots that grossly appeared as pus, consist of agglomerations of polynuclear leucocytes (Busch, or Busch—van Gieson).

Busch specimens (modifications of Marchi) show in many bundles scattered black spots corresponding evidently to most degenerated fibers. In Weigert sections most of the bundles show a fairly normal appearance; however, in the vicinity of the pus processes, evidences of destruction of considerable fiber masses are found, this is shown more clearly by these than the Busch specimens.

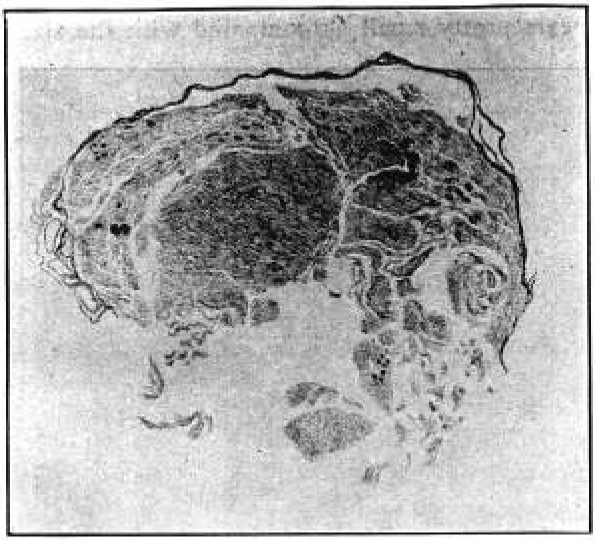

Fig. 4—Twelfth dorsal segment, showing marked destruction of the cord. Uppermost end of myelitic focus.

(2) Sacral Focus: On transsection the focus is seen to destroy most of the gray matter, only one anterior horn being fairly well preserved in appearance and outline, and a few cells left in the other one. Of the structure of the posterior horn nothing seems to be left. On the side of the preserved anterior horn, most of the white matter is also fairly intact. On the other side of the cord only the anterior column and a trace of the adjoining lateral column remains. The focus shows a large cavity or gap in the center. Fig. 1.

Histologically, it presents itself as a confluence of a great number of foci of circumvascular round cell infiltration. In some parts the vessels are very numerous and show large cells with large nuclei concentrically (onion-like) arranged, some of them budding into the lumen. Many of them appear like newly formed vessels. Besides these elements a very striking feature is the presence of a large number of vesicle-shaped round or oval cells, some of them very large, although all sorts of sizes are represented, some of them not being larger than a pus cell. These small ones are frequently without a nucleus. Most of the others have one nucleus and some apparently two nuclei. In the large cells the nucleus, although absolutely large, appears pretty small as compared with the size of the entire cell. Besides the chief central focus a number of small foci are scattered throughout the relatively well preserved portions of the cord. They are round cell agglomerations grouped around blood vessels.

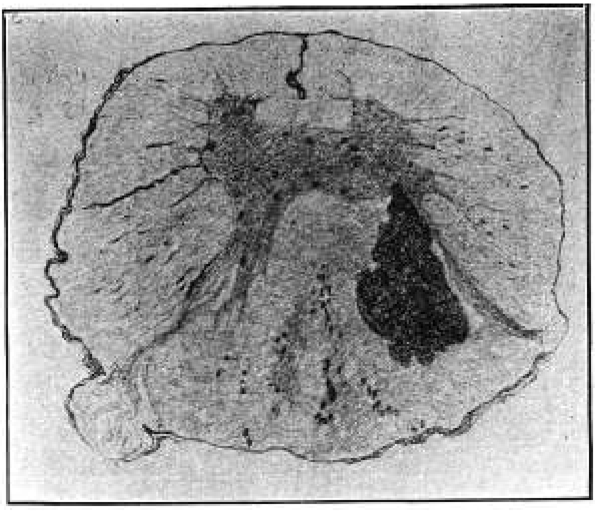

Fig. 5—Section at the dorso-lumbar junction, showing purulent foci in the posterior horn.

So far as Nissl specimens permit an expression of opinion (beginning post-mortem changes being evidently present) the cells that are left over have a normal appearance, many of them, however, being pigmented. Only a few cells show marked chromatolysis. Weigert and Pal sections of the sacral region show nothing particular except almost entire absence of nerve fibers in the region of the central focus. Fig. 2.

(3) Lumbar focus: Transsections show the lumbar region to be much smaller and distorted, the dura greatly thickened. The outlines of the gray matter can be made out with great difficulty, the anterior horns being the only parts of it that stand out. The remainder can hardly be made out at all. The anterior horn that is seen on the left side of the picture (Fig. 3) appears to be twisted sideward.

On the left side (in the picture) there is a focus reaching from the base of the anterior horn backward in a direction more or less parallel with the median fissure and being almost 1 cm. long (in dorso-ventral direction) and about 1 mm. wide (in transverse direction). This focus consists mostly of round cells. The majority of these are mononuclear, but in some places, especially in the central part of the focus there are accumulations of polynuclear and polymorphous leucocytes are present. (Fig. 3).

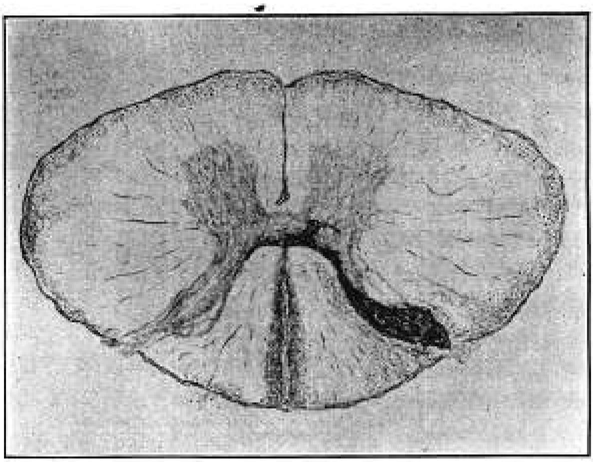

Fig. 6—Showing localized destructive process in the mid-dorsal region.

Another larger focus seems, as far as the distorted picture allows one to judge, to occupy the lateral part of the anterior horn and the region of the lateral column directly adjoining.

A number of smaller foci are scattered all over the transsection. They vary somewhat in their composition, however. Many consist of circumvascular accumulations of mononuclear round cells; at least these round cells are predominant or cover and hide almost all other elements if such be present. Other foci show chiefly swelling and apparent increase of the nuclei and cell bodies of endothelial cells, particularly in the smaller blood vessels, also of the nuclei of the muscular coat, and frequently numerous nuclei are seen in the neighborhood of such a vessel, bearing great resemblance to the nuclei of the endothelial cells, others to those of the non-striate muscle cells of such vessel, pointing thus to a proliferation and migration of muscular and endothelial elements of the vessels.

In some regions nuclei of the above two descriptions and mononuclear round cells (the latter standing out by their deeper stain and smaller size) are found accumulated in mixed profusion making it very difficult to trace their origin. The vesicular shaped cells or bodies found in the sacral region are also encountered here but not in such great numbers and most of them have no nuclei. They appear as hyaline bodies of different size.

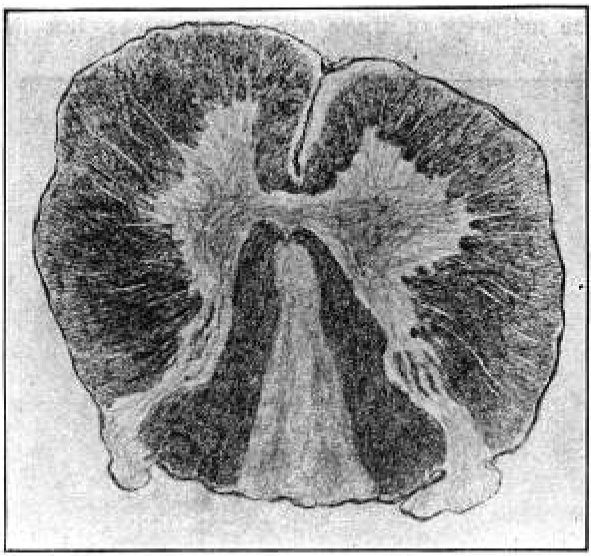

Fig. 7—Showing pronounced degeneration of the postero-internal columns in the cervical region.

Weigert sections show a marked scarcity of nerve fibers all over the transsection, in the white matter as well as the gray. This scarcity is on the whole fairly equally distributed, although particularly marked in the region of the foci.

The nerve cell changes seen in the anterior horn of Nissl specimens from the lumbar region are surprisingly slight. Cells with marked chromatolysis, i.e., with a pale, almost homogeneous center are seen, but their number is small. The others have practically a normal appearance.

Sections from the upper region of the myelitic focus (the lowest dorsal or uppermost lumbar region, Figure 4) show very marked destruction of cord. All that remains of visible structure of the gray matter is a group of large cells recognizable as anterior horn cells by their size and shape, and in another region isolated insula like two or three more cells are seen. The figure shows the great number of inflammation foci, present here, and an extreme thickening of the dura.

Sections a little lower, i.e., macroscopically quite near the upper end of the large myelitic focus show a large pus focus (see figure 5) in one of the posterior columns, reaching laterally to the gray matter and partly encroaching upon it, i.e., upon the neck of the posterior horn. Goll's column is here distinctly degenerated.

Sections from the middorsal region show that the cord here is the seat of extensive inflammatory changes. One large focus extends from the base of one anterior horn dorsad along the posterior horn, destroying evidently most of the latter. It consists largely of polynuclear leucocytes (pus cells) and shows a longitudinal cleft (artefact?) in its center. (Fig. 6).

The anterior horn of the same side is thickly beset with cells and nuclei, many of these being evidently nuclei of leucocytes, others apparently of other origin. Many blood vessels with their perivascular spaces thickly packed with round cells are seen, as well as a great number of minute hemorrhages, scattered over the white and gray matter. Owing to these changes the outlines of the gray matter are much obscured in many places, especially on one side.

The upper cervical region shows a pus focus occupying the head and partly also the neck of one anterior horn. Otherwise the inflammatory changes here are slight. Weigert specimens show a marked degeneration of Goll's column. (Fig. 7).

Sections from the midcervical region stained according to Busch show on one side marked degeneration of Goll's column, of the zone radiculaire, of an area corresponding pretty well to that of the pyramidal tract, and of Flechsig's and Gowers' tracts.

On the other side the degeneration involves Goll's column, a small dorsal zone of the zone radiculaire, and Gowers' and Flechsig's tracts.

Thus we have an extensive disseminated purulent myelitis with numerous foci and one relatively large cavity or pus pocket in the sacral cord. This was unquestionably the original focus, as the symptoms correspond closely to a lesion in such location. The striking and remarkable variation in the clinical picture in the last few weeks of the patient's life are to be explained by the dissemination of the purulent foci, the extension of the inflammatory process about them, and the widespread affection of the meninges.